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Ophthalmia Neonatorum: Its Treatment and Prophylaxis.

BY G. E. DE SCHWEINITZ, M.D.,

*Professor of Ophthalmology in the Philadelphia Polyclinic; Ophthalmic  
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A LECTURE DELIVERED AT THE PHILADELPHIA POLYCLINIC.

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THIS afternoon we will study purulent ophthalmia, as it occurs in the newly-born infant.

This inflammation is characterized by great swelling of the lids, serous infiltration of the conjunctiva, and the free secretion of contagious pus.

It is caused by the introduction into the eye of infecting material from some portion of the genito-urinary tract of the mother at the time of or shortly after birth. The majority of cases, and probably all severe forms, are due to the presence of the gonococcus of Neisser, very typical examples of which you will see in the slide placed under the microscope. Exceptionally, inoculation appears to take place *in utero*; and Mules, in his excellent essay upon this topic, has attributed a high degree of penetrating power to the micro-organism, based upon his examination of a child, who was brought to him eight hours after delivery, exhibiting the symptoms of the second stage of the disease; hence infection

*in utero* must have occurred at least two days before birth or rupture of the membranes.

The gonococci are not always present. They are especially numerous during the purulent stage. On this account, two varieties of the disease have been described—one, a severe type, associated with the micro-organism, and exhibiting a tendency to increase in severity and attack the cornea; and another, a milder type, non-specific, and with a tendency to recover. Do not forget that a virulent vaginal discharge in the mother is not necessary to produce this condition, as it probably may arise from the introduction of any muco-purulent discharge during birth. Infection after birth may be caused by soiled towels or sponges, and some have supposed that contact with the lochial discharges may originate a form of the disorder. Inoculation of healthy lochia, however, by Andrews, Zweifel and others, has failed to produce the disease. Inoculation is more



likely to occur in retarded labors and with face-presentations. Boys are said to be more frequently attacked than girls, and a curious relation between the temperature and this disease has been demonstrated by Emmert, of Berne. In cold climates ophthalmia neonatorum is especially frequent in the summer months; in hot countries, in the spring and autumn.

You will notice that the gonococci surround the nuclei within the living cell; later they penetrate the epithelium and enter the lymph spaces. The shape of the micro-organism is not peculiar to the gonococcus of purulent ophthalmia, because diplococci of exactly the same appearance are seen under other circumstances; but the arrangement of the gonococci within the protoplasm of the cells is characteristic of this species of micro-organism. You have observed how easy a matter it is to stain and demonstrate them. I would earnestly advise you in all cases of purulent secretion from the conjunctiva to make this examination. In ophthalmia neonatorum it furnishes an important prognostic guide.

Ophthalmia neonatorum usually begins on the third day after birth, but it may set in from twelve to forty-eight hours after inoculation. The variety which results as a secondary infection from soiled fingers, or sponges, or cloths, arises at a much later date. Almost always both eyes suffer, one being earlier and more decidedly affected than its fellow.

Systematic writers divide the disease into four stages—the stage of incubation, the stage of lymph formation, the purulent stage, and the stage of recession. But in a typical case

these grades shade into each other so easily that it is hard to distinguish them.

In brief, the following are the chief characteristics of this very important disease: slight redness of the conjunctiva, with a trifling discharge in the corners of the eyes rapidly gives place to a great cushion-like swelling of the lids, with chemosis of the conjunctiva, severe pain and discharge. The surface of the swollen lid is dusky red and tense; the discharge, which in the beginning is slightly turbid, soon changes to a greenish-yellow pus, which is secreted in great quantities. During the first day or two the conjunctiva is swollen and velvety, and easily detached flakes of lymph are found upon its surface; later it becomes rougher, dark-red in color, and spots of ecchymosis appear. The chemosis of the ocular conjunctiva forms a hard rim around the cornea, and at the bottom of the crater-like pit thus produced this structure is visible. The thick, cream-like discharge increases, and either flows out from beneath the overhanging lid or is backed up in the conjunctival cul-de-sac. Gradually the disease declines, the lids lose their tense character, the conjunctiva is puckered into folds, the discharge becomes admixed with blood and serum, and ceases in from six to eight weeks.

The chief danger is destructive ulceration of the cornea. This danger is especially prone to occur if, during the first day or two of the disease, the membrane is lustreless and hazy. Small, oval ulcers may form near the limbus, which soon are surrounded by an area of infiltration, and rapidly increase in size, or larger lesions develop directly in the centre of the corneal

tissue. If the disease is not checked, the ulcer will perforate, and all of the complications attending this disaster become manifest—evacuation of the aqueous, incarceration of the iris in the wound, the formation of an adherent leucoma or scar in the cornea, which, unable to resist the intraocular tension, bulges forward and forms, according to its original size, either a partial or total staphyloma. Finally, perforation may be followed by inflammatory involvement of the ciliary body and choroid, and rapid destruction of the eye through panophthalmitis.

Do not forget that a dense opacity sometimes appears in the cornea during convalescence. It may arise with great suddenness, and, when it occurs in the lower half of the cornea, a deep indentation from the pressure of the margin of the lid is likely to occur. It is quite possible that ophthalmia neonatorum will not follow the course just described, and sometimes this name is given to very mild types of conjunctivitis, which occur in the newly-born, and which have no such destructive tendencies. Do not allow yourselves, however, ever to be led into a false sense of security when you find pus or muco-pus in the eyes of a newly-born child. It may indicate a mild, non-specific type, but it may be the beginning of disease, which, if improperly or inadequately treated, will forever mar the sight of the patient.

I will not attempt this afternoon to give a description of the various methods of treatment which have been pursued in this disease, but will briefly describe the procedure which has proved efficacious in my own hands, especially in the wards of the

Philadelphia Hospital. This deals with three conditions: the inflammatory swelling of the lids, the state of the conjunctiva, and the corneal complications.

During the earlier stages, when the lids are tense and the secretion has not the creamy character which it later assumes, in addition to absolute cleanliness, the *local application of cold* is the most useful agent. This should be applied in the following manner: upon a block of ice square compresses of patent lint are laid, which in turn are placed upon the swollen lids, and are as frequently changed as may be needed to keep up a uniform cold impression. This is far preferable to the use of small bladders containing crushed ice. The length of time occupied with these cold applications must vary according to the severity of the case. Sometimes they may be almost continuously used, and sometimes frequently for periods of half an hour. Later on, when corneal complications exist, *hot fomentations* are better than cold. These are employed in like manner with squares of antiseptic gauze wrung out in carbolyzed water at a temperature of 120° F., and frequently changed.

See that the discharge is constantly removed. Gently separate the lids, wipe away the tenacious secretion with bits of moistened lint or absorbent cotton, and irrigate the conjunctival sac freely with an antiseptic solution. For this purpose a solution of boracic acid, or one of corrosive sublimate, a grain to the pint, may be employed. You will frequently see it stated that boracic acid is so feeble an antiseptic that it is valueless for the purpose that I have just stated; moreover, it is practically without germi-



cidal power. That it is a feeble antiseptic is perfectly true, but you must remember that its purpose in the present instance is to act as a slight astringent and a cleansing agent. You cannot kill the gonococci that have penetrated within the cells with a solution; at least, you cannot use a solution of sufficient germicidal strength that will not at the same time be deleterious to the cornea. Although bichloride of mercury is constantly employed, and, although I always employ it myself, it is by no means certain that, as it is ordinarily used, it has any pronounced germicidal value in this disease, because it has been shown that bacteria, in the presence of albumin, have the power to reduce it to calomel. I have found it very useful to use both boracic acid and bichloride of mercury alternately every half hour or every hour, according to the amount of secretion. Let the irrigation be kept up day and night if necessary; only be sure that you keep the surfaces as clean as possible.

Many other drugs have been used: alum, sulphate of zinc, weak solutions of nitrate of silver, creolin, permanganate of potash, aqua chlorini, peroxide of hydrogen and pyoktanin. Do not use pyoktanin. In spite of the high reputation of its patron saint, it is valueless, in my judgment, in this disease. My colleague, Dr. Gould, and myself have demonstrated this to our satisfaction in the Philadelphia Hospital.

The application of nitrate of silver at the proper stage is, perhaps, the most important procedure. It must not be used early, before free discharge is established, nor in those cases, no matter what the stage, when the lids are tense and board-like and

the surface of the conjunctiva is covered with a gray film or false membrane. When the secretion is free and creamy, when the lids are relaxed, when the conjunctiva is dark-red and puckered into folds, the time for its application has come. Once a day carefully evert the lids, free the conjunctiva from all adherent secretion, and brush it over carefully with a solution of nitrate of silver, 10-20 grains to the ounce. In severe cases it may be necessary to use the mitigated stick, care being taken to neutralize the excess with common salt: As long as the discharge is abundant, the use of this caustic is indicated. It has a double action, viz., that of a germicide and that of an astringent. Unlike bichloride of mercury, its germicidal value is potent, because it destroys the superficial layer of epithelial cells and probably many of the contained micrococci.

At the first appearance of corneal haze, a solution of atropine, four grains to the ounce, may be dropped into the eye two or three times a day. If the ulcer is marginal and if danger of perforation is imminent, or if there is a very distinct sloughing in the cornea and the iris is uninflamed, eserine is the better drug. This may be used in a strength from a quarter to a half grain to the ounce, and, as it is somewhat irritating to the ciliary body, there is no objection to using atropine at night. The former drug may be employed four or five times a day, and the latter once or twice in the evening.

The attendants of a case should be impressed with the responsibility which devolves upon them. The contagious nature of the pus should be explained to them, and they should

take great care to destroy all rags, cotton, etc., which have been used in the treatment of the disease. It is said that Stellwag was wont to declare that he never lost a case of acute blennorrhœa of the conjunctiva if he was assisted by an old and tried nurse, but that if it was necessary to change nurses disaster was sure to result.

And now a word or two in regard to its *prophylaxis*.

According to the Report of the Royal Commission of the Blind, the statistics of Professor Magnus, of Breslau, demonstrated that 71.99 per cent. of all who become blind during the first year of life are rendered sightless by purulent ophthalmia. In other words, he has shown that of every 10,000 children under five years of age, 428 are blinded by this type of conjunctivitis. The proportion of blind from this cause in the asylums of Switzerland is 26 per cent.; in Spain and Belgium, about 12 per cent.; and in the United Kingdom, 30 per cent. of the inmates of institutions and 7,000 persons have lost their sight from the same disease. Rivièrè, of Bordeaux, forcibly exclaims that purulent ophthalmia alone is responsible for nearly one-third of the cases of blindness, and has placed in the care of Europe well-nigh 100,000 victims. More than 32 per cent. of blind in our own country own their affliction to ophthalmia neonatorum; and Howe, of Buffalo, in a collection of 8,574 cases of labor conducted without preventive methods, found 8.66 per cent. of blennorrhœas.

In the face of these facts, the measures to prevent ophthalmia neonatorum rank in importance with those employed against smallpox and tuberculosis, and demand the as-

siduous practice of means which experience has taught to be effective. The day should not be far distant when stringent legislative regulations will be in force militating against this appalling cause of blindness.

The following words, quoted from the Report of the Committee on the Causes and Prevention of Blindness of the American Ophthalmological Society, are of great importance: "The fact that nurses and midwives in most States have a very irresponsible position which enables them to do much harm—the fact that a very little neglect or delay with this class of cases often results most disastrously to the patient, and the fact that the duty of nurses in this respect in foreign countries has already been established, and at least by one State in the Union—inspires the hope that creditable reformation may take place in other parts of our own land." And, again, "Finally, the Committee would strongly recommend in the medical colleges throughout the country that more attention be given by the faculties to the course of ophthalmology, making it as long and thorough as the requirements of other branches will admit."

In the absence of distinct governmental interference, it is the evident duty of physicians, nurses and directors of public charities to instil among the poorer classes a knowledge of the dangers of the disease and the necessity for prompt treatment.

It would be very interesting to trace from the beginning the first methods of prophylaxis which were employed, but time will not permit. Crèdè, of Leipsic, deserves the credit of having secured, by the use of nitrate of silver, a rational preventive treatment. His



method, as you know, consists of the instillation of two drops of a two per cent. solution of nitrate of silver in the eyes of the newly-born child, which, as soon as it is expelled from the maternal passages, and before the cord is cut, is placed upon its back in the bed, the eyelids parted, and the drug introduced. This in some instances is repeated on the second day. In the meantime, small compresses soaked in a solution of salicylic acid are laid upon the closed lids.

Previous to the nitrate of silver treatment, 10.7 per cent. of ophthalmias occurred; after the introduction of the method among 1,160 cases of labor, the percentage of ophthalmia fell to 0.31.

Very many other methods besides Crèdè's have been tried, and obstetricians like Kaltenbach have advocated that no local application be made to the eyes other than that of distilled water, but that during the labor persistent vaginal douches of bichloride of mercury be employed; and Korn also concludes that painstaking cleanliness during birth and also in child-bed will reduce the possibility of this disease to a minimum.

The method of Hegar-Kohn has been largely advocated, which consists in employing Van Swieten's liquid (corrosive sublimate, 1 part, alcohol, 100 parts, water, 900 parts) in order to cleanse the eyes of the newly-born child, as well as all of the surrounding areas—the root of the nose, the margins of the lids and eyebrows. It is true that the instillation of the silver solution sometimes causes hyperæmia

of the conjunctiva, but this usually disappears in a day or two. Very occasionally severe hæmorrhage has followed its instillation. Pomeroy and myself have reported instances of this character. These, however, are insignificant complications compared with the vast benefit which this preventive treatment entails. Schmidt-Rimpler believes that aqua chlorini, which is unirritating, is quite as efficacious as the nitrate of silver. It matters little, perhaps, in the preventive treatment what remedy is employed: nitrate of silver, bichloride of mercury, aqua chlorini, or scrupulous antisepsis during labor; but certainly one or other of these should be used. If in spite of it, or because of lack of it, within twelve hours after birth, a little redness of the eyes begins to develop and a slight secretion gathers in the corners, do not permit the surrounding attendants to deceive you with the belief that this is a "cold in the eye," or a natural consequence of the change in the baby's environment. Do not allow the good old nurse, who now, happily, is being relegated to the background, to wash the eye with milk because she has washed the eyes of babies during forty years of experience with the same collyrium. Remember, this may be the incipient stage of a destructive inflammation which will destroy the baby's eyesight if it is not properly treated, and which ought to destroy forever your peace of mind if you permit yourselves to neglect the warnings.









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